

CLAIMS

THAT CLAIMED IS:

1. A subsea wellhead assembly, comprising:
 - a tubular wellhead member having a bore;
 - a recess formed in the bore and having an upward facing ledge;
 - a hanger for supporting a string of conduit; and
 - a collet located on an outer surface of the hanger, the collet having a protruding lower portion that extends radially outward from the hanger and engages the ledge of the recess, the collet having an upper portion that rotates radially outward and engages the recess as the hanger slides axially downward after the protruding lower portion of the collet engages the upward facing ledge.
2. The wellhead assembly of claim 1, further comprising a tapered surface formed along the outer circumference of the hanger which slides axially downward relative to the collet after the protruding lower portion of the collet engages the upward facing ledge to rotate the upper portion of the collet radially outward.
3. The wellhead assembly of claim 2, wherein the lower portion of the tapered surface has a smaller circumference than the upper portion of the tapered surface.
4. The wellhead assembly of claim 1, further comprising a back-up ring located between the collet and the hanger for rotating the upper portion of the collet radially outward.

5. The wellhead assembly of claim 4, wherein the back-up ring has a hemispheric cross-section and is positioned so that the flat portion slidably engages the hanger and the arcuate portion engages the collet when the hanger slides axially downward after the collet engages the upward facing ledge.
6. The wellhead assembly of claim 4, wherein the back-up ring is a split ring.
7. The wellhead assembly of claim 2, further comprising a back-up ring that rotates the upper portion of the collet while slidably engaging the tapered surface of the hanger.
8. A subsea wellhead assembly, comprising:
 - a tubular wellhead member having a bore;
 - a recess formed in the bore and having an upward facing ledge;
 - a hanger for supporting a string of conduit that is lowered into the bore;
 - a tapered surface formed along the outer circumference of the hanger;
 - a collet located around the circumference of the casing hanger, the collet having a protruding lower portion extending radially outward from the hanger for locating and engaging the upward facing ledge and an upper portion for engaging the recess; and
 - a back-up ring located between the tapered surface and the collet that slidably engages the tapered surface of the hanger to rotate collet so that the upper portion of the collet rotates radially outward and matingly engages the recess as the hanger slides axially downward after the protruding lower portion of the collet engages the upward facing ledge.

9. The wellhead assembly of claim 8, wherein the tapered surface slides axially downward relative to the back-up ring after the protruding lower portion of the collet engages the upward facing ledge to rotate the upper portion of the collet radially outward.
10. The wellhead assembly of claim 8, wherein the lower portion of the tapered surface has a smaller circumference than the upper portion of the axially tapered surface.
11. The wellhead assembly of claim 8, wherein the back-up ring has a hemispheric cross-section and is positioned so that the flat portion slidably engages the tapered surface and the arcuate portion engages the collet when the hanger slides axially downward after the collet engages the upward facing ledge.
12. The wellhead assembly of claim 8, wherein the back-up ring is a split ring.
13. The wellhead assembly of claim 8, further comprising a plurality of protrusions formed around the outer circumference of the upper portion of the collet for engaging the recess.
14. The wellhead assembly of claim 8, further comprising a plurality of grooves formed around the inner circumference of the recess for engaging the upper portion of the collet.
15. The wellhead assembly of claim 8, wherein the lower portion of the collet further comprises a hanger ring protruding radially outward for engaging the upward facing ledge.

16. A method of landing a hanger with a string of conduit suspended therefrom in a subsea wellhead assembly, comprising:

providing a recess in a bore of a tubular wellhead member and a hanger with a string of conduit suspended from its lower end;

locating a collet around an outer surface of the hanger with a protruding lower portion extending radially outward a predetermined distance;

lowering the conduit and hanger into the bore of the wellhead member and engaging a lower edge of the recess with the protruding lower portion of the collet; and then

while the ledge prevents the collet from sliding axially downward relative to the bore of the wellhead member, rotating the upper portion of the collet outward into locking engagement with the recess by continuing to lower the hanger axially downward into the bore.